

Cover Figure: In our everyday life we encounter oil-water emulsions in many different forms, both in nature (e.g. milk) as well as in industrial products like cosmetics and pharmaceuticals. In order to be stable, oil-water emulsions require some kind of emulsifying agent which prevents the oil phase droplets from coalescing and eventually forming separate oil and water phases. While the liquid fats in milk are stabilized naturally by proteins and protein-like compounds, industrial emulsions usually require high amounts of additives called surface active agents. These surfactants can be hazardous to humans and the environment and it is desirable to substitute them with harmless substances. One approach is to use colloids as emulsifying agents. The front cover shows an image of an oil-water emulsion containing 1% v/v paraffin oil in water with 0.1 % w/w colloidal Ca/Al layered double hydroxide (LDH) as emulsifying agent, taken with the Stony Brook X1A scanning transmission x-ray microscope. Imaging near the calcium-L-absorption edge allows us to map the calcium containing LDH with a spatial resolution of around 70 nm and therefore distinguish LDH from oil and water. When tuning the photon energy to high absorption for calcium (left image), the LDH can be highlighted. For pre-edge energies, the LDH becomes transparent because its absorption coefficient is almost equal to that of water and the oil droplets inside the LDH envelope can be revealed (center image). The right image shows a quantitative calcium map in a range between 0 and 2 micrograms per square centimeter, calculated from the other two images. Studying these emulsions in their natural hydrated state at atmospheric pressure with high spatial resolution is important to better understand the stabilization mechanism and its dependencies and compare it to existing models from colloid chemistry. To our knowledge, the information obtained is currently not accessible by any other techniques.

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